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JULY, 1929

ENTOMOLOGICAL NEWS

Vol. XL No. 7

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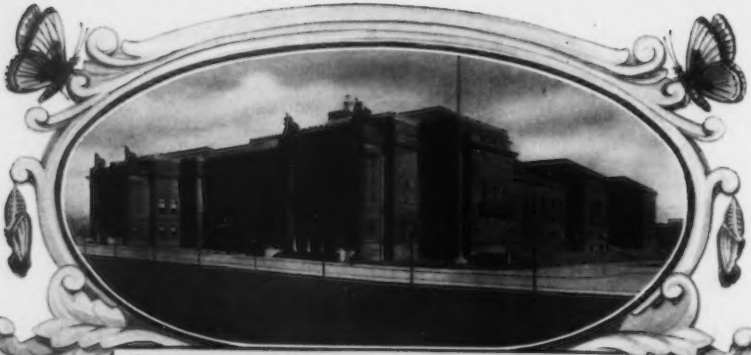

CARNEGIE MUSEUM, PITTSBURGH, PA.

DR. ANDREY AVINOFF DR. W. J. HOLLAND

ENTOMOLOGICAL NEWS

VOL. XL. JULY, 1929 No. 7

VI. The Carnegie Museum, Pittsburgh, Pennsylvania.

By. J. D. GUNDER, Pasadena, California.

(Plates X, XI)

It has been truly said that none of the makers of great fortunes began their industrial careers closer to absolute zero than did Andrew Carnegie. Shortly after emigrating from Scotland with his parents to Allegheny, Pennsylvania, in 1848, he became their sole support at the age of fourteen, working first as an engine-room clerk and then as a telegraph boy in Pittsburgh. Through steady labor and sheer ability, he rose, step by step, to the superintendency of the Pennsylvania Railroad in 1860. Already a small capitalist, he foresaw about this time the possibility of iron and steel over wood, especially in bridge construction and therefore entered that business, introducing the Bessemer ore smelting process from England to America in 1868. As a result the Carnegie Steel Corporation was eventually founded and he became in the early '90s a world financier.

With the accumulation of vast wealth, Mr. Carnegie decided to retire and to consecrate the remainder of his life to public service; thereby returning, first to the people of Pittsburgh and then to Americans generally, what he had in personal profits drawn from them. As a youth he craved books and really made use of the knowledge obtained from the few which he could get hold of. He also knew by experience how difficult it was in the early days of the poor man to have access to good volumes, particularly to works upon technical subjects. Consequently the free public library idea was conceived and in 1895 the great Carnegie Library of Pittsburgh in Schenley Park was opened unreservedly to the public. Shortly afterwards he realized the need of building, in conjunction with this library, a museum for the Arts and Sciences; thus what is

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termed as a whole, the Carnegie Institute, came into being. The latest or more recently enlarged portion of this building was formally opened to the public in April, 1907. The total gifts from Mr. Carnegie to the Institute for all purposes amount to well over $36,000,000. It is his largest single foundation among his many and varied bequests. Mr. Carnegie had no special private hobby or zoological collection of any kind, though he was interested in paleontology and natural history at large. At one time, however, he personally bought and presented to Dr. Holland, a collection of Indian lepidoptera. Mr. Carnegie passed away at Lenox, Massachusetts, on August 11, 1919.

I believe that the Carnegie Museum is considered the most beautiful museum edifice, both inside and out, of any in America. Certainly the interior decorations are costly and in exquisite artistic taste. The Hall of Sculpture, for example, is beautiful in itself and leaves with the visitor a lasting impression of real architectural harmony and quiet grace of design. Some one has said that, "the walls of a museum should be to its contents what the frame is to a good picture"; certainly the generosity of the founder has made this ideal a reality.

In 1898 Dr. W. J. Holland became the first director, retiring as Director Emeritus in 1923 in favor of Dr. Douglas Stewart. Upon the lamented death of that gentleman some three years later, Dr. Andrey Avinoff was chosen to fill the vacancy. He is a man of great personal charm and culture and fortunately for entomology has always made that branch of science a favorite study. In Europe he had published many papers upon Lepidoptera, dealing especially with the *Parnassius* and *Eurymus* (Colias) groups. Quite recently several have appeared in co-authorship with Dr. Holland. I predict a continued and bright entomological future for the Carnegie Museum.

Dr. Avinoff was born February 14, 1884, at Tulchin in the province of Volynia. He belongs to one of the oldest families of the Russian nobility, his ancestors having played a distinguished part in Russian affairs as far back as the fourteenth century. Cape Avinoff on the coast of Alaska bears the name

of his paternal grandfather. During boyhood his father, who was a Lieutenant-General in the Imperial Army, was for a time stationed at Tashkent, the capital of Russian Turkestan. Here young Andrey began to take an early interest in entomology and to collect butterflies and moths. Usually his summer vacations were passed amid the mountains of Tian-Shan. He was matriculated in the College of Law of Moscow in the year 1905. While pursuing legal studies, he never failed to devote himself whenever possible to the study of natural history and took a full course in botany and biology in that University. After graduation Dr. Avinoff was appointed a member of the Tribunal of the district of Poltawa, his duties corresponding to those of an Assistant District Attorney in the United States. In 1907 he was transferred to the staff of the Chancellory of the Senate in St. Petersburg and in 1909 was made Assistant-Secretary-General of the Senate in the Department of Administrative Control. His appointment as Gentleman-in-Waiting to the Czar came in 1911. Those duties related mostly to the ceremonious presentation of distinguished personages at the Court. Later he was elected Marshall of Nobility in the district of Poltawa where his mother's estates were located. In this capacity he was in charge of all local judicial, educational, and charitable institutions. The outbreak of the World War in 1914 found him at the front with the Red Cross, but a year later he was sent to the United States to purchase supplies, partly for the army and partly for the relief of the sick and wounded. When the Revolution occurred in 1917, he was again sent to this country and while here the Bolshevist coup-d'état took place. Realizing the hopelessness of returning to his native country Dr. Avinoff took the necessary steps and became an American citizen, working for sometime with the War Industries Board clearing up matters involved under the old regime. His first connection with the Carnegie Museum came in 1924 as associate curator of entomology.

Dr. Avinoff had one of the largest private collections of Lepidoptera in Europe. For example, there were represented about ten thousand specimens of *Parnassius* and an equal number of *Eurymus*, including many types and variations *Eurymus*

imperialis, Parnassius loxias, etc. At the time of the Bolshevist revolution this material was all seized and "nationalized" by the new government. It is at present in the possession of the Leningrad Academy of Science. Unfortunately his great entomological library was destroyed when his country home was looted and burned to the ground. Beginning in about the year of 1906, Dr. Avinoff continually sent expeditions throughout Europe and Asia. He financed nearly forty collecting parties through all parts of arctic and temperate Asia. He, himself, in 1908, visited the Pamir district (Central Asia) as a naturalist, accompanied by a noted young hymenopterist. In 1912, he went to India and explored Kashmir, Little Thibet, traversed the Karakorum and entered Chinese Turkestan by way of Yarkand and Kashgan. The whole expedition was made in company with two companions, one a distinguished European entomologist, the other an ornithologist and mammalogist. Upon his return from this journey, Dr. Avinoff received the Gold Medal of the Imperial Geographic Society of Petrograd in recognition of his Asian zoogeographic researches. He was a member of the Entomological Society of St. Petersburg and still holds fellowships in the Societies of London, France and the Netherlands. His executive ability, his broad knowledge of science, as well as his fine attainments as a linguist, all coupled with his personal acquaintance with scientific men and institutions, both in Europe and America, make him a most competent leader to carry on the difficult tasks as head of this great Pittsburgh institution.

The entomological department of the Carnegie Museum came into being when the institution was established and occupies a rather large, well lighted and slightly L-shaped room on the third floor. A gallery over one portion gives access to a number of the cabinets which extend to the ceiling. All the insect drawers are of uniform size with neat looking drawer pulls and convenient contents signs. Dr. Holland has been Honorary Curator for many years. Dr. Hugo Kahl is curator and besides being an all-around entomologist, he specializes somewhat in Diptera and Odonata. Mr. Henry Klages, coleopterist, and Mr. Bernard Krautwurm, lepidopterist, are

permanently employed as assistants. The following collections of lepidoptera of note are the property of the Museum:—those of A. V. Knyvett of Indian material, Henry Engel, H. A. Smith, Frank Kneehtel, H. L. Weber, J. A. Reis, A. J. Good, African, Steinbach and S. M. Klages from South America; Fred Marloff of local micro-lepidoptera; Krautwurm, Geo. A. Ehrman, both local and exotic, C. B. Antisdel and Dr. Holland's, especially African.

The B. P. Clark collection (Boston, Mass.) of world Sphingidae is gradually being transferred to the Museum as a permanent deposit. Mr. Clark wishes to retain actual ownership during the remainder of his lifetime. Some of this material is being held in Boston as a working basis. The well known W. H. Edwards' collection of North American Lepidoptera is still the property of Dr. Holland and is kept in the Museum in its original cabinets, which are about in the same condition of arrangement as Mr. Edwards left them in 1889. At sometime in the past, numbers of the specimens became molded and turned blackish therefrom, but luckily this condition has not affected any of the major types as far as I can find out. For the most part the type specimens have the word "type" written across the principal labels in red ink. Some lepidopterists visiting Pittsburgh are disappointed at finding only a relatively small proportion of United States and Canadian diurnal lepidoptera represented, but it must be remembered that Dr. Holland, though editing books upon American lepidoptera, has been for years specializing on exotic material, leaving the boreal American work to such students as Barnes, Skinner and others. The recently acquired Ehrman collection is general in scope, but unfortunately many of the specimens have never been in what would be called first class condition. Generally speaking, the Museum may be termed especially strong in equatorial African and Central and South American material and this is due entirely to Dr. Holland's energetic and persistent efforts in those directions. It is estimated that there are between four hundred and five hundred thousand mounted lepidoptera altogether in the Museum's collections.

Dr. Holland has very kindly given to me the following,

especially written biographical sketch of his life and I am pleased to place it on record for the readers of the ENTOMOLOGICAL NEWS. His is a life full of action, romance and accomplishment.

"My father, Rev. Francis Raymond Holland, when I appeared upon the scene, August 16, 1848, was a Moravian missionary in Bethany, Jamaica. He was descended from one of the early settlers of Salem, North Carolina (now Winston-Salem). My mother, Augusta Eliza (Walle) Holland, was the only child of Jacob Wolle of Bethlehem, Pennsylvania, a well-known citizen of that town and long the President of its Council. On the maternal side I am descended from the earliest settlers of New England, Manhattan and Pennsylvania, whose names are not unknown and who acted well their parts in their day. Both my parents were highly respected and deeply interested in natural history. My mother's cousin was Dr. Thomas Horsfield, for fifty years the Director of the India Museum in London. He wrote extensively upon the fauna and flora of the East Indies. My father's father was an amateur botanist and a keen sportsman. His hobbies were the hybridization of cacti and apiculture. My father himself was a conchologist and botanist. My mother's father was the friend and correspondent of most of the American botanists of the last century, among them De Schweinitz, Short, Mead, Darlington, Sprague, and Asa Gray. He also corresponded and exchanged with many of the botanists of Europe, especially Grisebach, the author of the 'Flora of the British West Indies'. His herbarium has been deposited by me as a loan in the Museum.

Father's home in Jamaica seemed to be headquarters for naturalists and sooner or later lovers of nature found their way there. C. B. Adams, Professor of Zoloogy at Amherst College, lived for a long time with us while pursuing his studies on the Island. My mother told me he often rocked my cradle when I was an infant. Philip H. Gosse, the author of 'The Birds of Jamaica', was one of my father's friends and in his old age I myself corresponded with Mr. Gosse about butterflies and we made several exchanges. His son was Edmund Gosse, the poet and Librarian of the House of Lords whom I later learned to know in London.

On returning to the United States in the spring of the year 1851, my father was appointed the pastor of the Moravian Church at Dover, Ohio, and sometime later to a rural charge, known as the Sharon Church, near what is Tuscarawas, Ohio. He had brought back with him from Jamaica a large number of shells, plants and insects and these found a place in the manse. As a child I was permitted the examination of these collections and on rainy or snowy days I delighted to look them over and gradually came to know some of their Latin names. My mother taught me to draw and to paint and I still have among my papers a number of sketches of those Jamaican shells and butterflies which I drew from life before I entered my teens. Our life in the country charmed me. My father, whom I accompanied as he went his pastoral rounds, encouraged me to collect plants, the scientific names of which he gave me as he could. We explored together the woods and the fields about the home. I collected land shells on the hillsides and from the brooks the Unionidae, and gradually I became acquainted with the living things about me. Fish were abundant in the streams in those early days and one of my boyish triumphs, although I was not yet ten years old, was to capture a big Channel Catfish, weighing about twenty pounds and which I took upon an outline which I had set in the Tuscarawas River.

In the fall of 1858 my father was transferred to the pastorate of the Moravian Church at Salem, North Carolina, and I was sent for a time to a parochial school for boys. Later my education was committed to private tutors. All the spare time I could command was devoted to collecting birds, birds' nests and eggs and to fishing or shooting. My father taught me how to prepare bird-skins and to rear and mount insects. The back verandah of our house was covered in the summer and fall with breeding boxes in which I reared many lepidoptera. The librarian of the Salem College for Women was Mrs. Mary L. Denke, the widow of a distinguished missionary to the Indians. She had lived long in France and was a highly cultivated woman. Through her I was permitted the use of Wilson and Bonaparte's great work on the birds of America. I possessed myself of Say's 'American Entomology' and of what-

ever books relating to entomology I could lay my hands on at the time and from these I made fairly faithful water-color drawings of many of the illustrations. Being provided with a carpenter's bench and tools I learned to make my own insect boxes, a few of which I still possess.

About the time the Civil War broke out I was ready to take my examinations for entrance into college. My father thought of sending me to the University of North Carolina, but the war closed the doors of that institution, so I went on with my studies in the forenoons under a most capable tutor and the afternoons were given over either to sport or some natural history diversion. In the fall of 1863 the family came north by the 'Underground Route', a trip full of adventure for a boy, as well as for the adults. We arrived at Bethlehem, Pennsylvania, late in November, my grandfather having meanwhile died. We found our home under the roof of the old house in Bethlehem and I immediately entered the Moravian College to an advanced standing, for I had already mastered an elementary knowledge of Latin, Greek and mathematics. German and French were in a measure 'mother-tongues' to me, for from my earliest childhood I had been taught to use those languages. Mrs. Denke spoke French like a native, as she had been in early life the governess and companion of the daughters of Mr. Munroe of Paris and she insisted upon speaking French with me at all times, which was to my advantage.

I pass over the years spent at Bethlehem, but I might add that my Saturday afternoons and vacations were given over to drawing and painting in oil and water-colors under the tutelage of Gustav Grunewald, a celebrated German artist then living in America. I had completed my course in the Moravian College by June, 1867.

As I was too young after completing this college course at Bethlehem to think of entering the clerical calling, which my dear father insisted I should follow, he sent me to Amherst College, where I matriculated in the middle of the Junior year in the class of 1869. The work I was called upon to do in Amherst, so far as the languages were concerned, laid no burden upon me whatever. I was excused from attendance

W J Holland

upon classes in German, but at Commencement I was required to give the 'German Oration' and I chose as my theme, Bismarck, who was then at the height of his glory. At Amherst I became deeply interested in chemistry, physics and geology; also taking a course in astronomy under Professor Esty. Dr. Edward Hitchcock gave me some practical instruction in paleontology. My greatest debt was to Professor Julius Seelye, who later became President of the College. He was a sort of second father to me and set me delving into the writings of Kant, Hegel and Fichte. My room-mate during my senior year was Neesima, the first Japanese educated in America. He taught me Japanese in return for assistance given him in the study of Greek. Later he played a great role in Japan, founding the Doshisha, the University of Kyoto. At the end of my senior year I was elected Principal of the Amherst High School (1869-70), and then became the Principal of the High School at Westborough, Massachusetts (1870-71).

In the fall of 1871 I entered Princeton Theological Seminary, at last giving away to my father's wishes that I take up preaching. I studied there for three years, devoting myself more particularly to Hebrew, Chaldee and Arabic. Writing in my eightieth year, I may say that my Arabic has largely evaporated, but that my Hebrew still abides with me in some strength!

By 1874 I had learned enough about religion to hold down the pastorship of the Bellefield Presbyterian Church in Pittsburgh. Fortunately, and as a relief from pure clergical work, I was almost immediately thereafter made a Trustee of the Pennsylvania College for Women. There, as an act of charity, I became the Professor of Ancient Languages, which position I held for sometime. I went to Europe in 1877 as a delegate to the Pan-Presbyterian Council held in Edinburgh. It gave me a chance to see and travel through some of the countries not before visited.

With my newly-wedded wife I again went to Europe in 1879 to attend a meeting of the Evangelical Alliance held at Basle, Switzerland. Later we made an extensive tour of the Continent.

About this time I again renewed my interest in natural history and resumed the collection of insects. I felt I needed diversion from the narrowness of the ministerial profession. Some of my young missionary acquaintances were going to Africa, Asia and South and Central America and they were induced by me to collect in those parts of the world. My collections grew rapidly and I kept adding to my entomological library. I soon discovered that I had accumulated quite a few species new to science evidently, so I began my first attempts at publication.

In 1887 I went to Japan as the Naturalist of the Eclipse Expedition sent out by our Navy Department and the National Academy of Sciences. Again in 1889 I went on a similar expedition to West Africa.

About this time I purchased from William H. Edwards his collection of butterflies of North America which he was on the point of selling to Europe. I agreed in exchange for the collection to pay all the expenses of producing the third volume of his celebrated work, 'The Butterflies of North America'. By this time my collections of exotic lepidoptera had grown by leaps and bounds. I had in my employment, Mr. Wm. Doherty, one of the ablest collectors who ever lived. He collected extensively for me in the Himalays, Burmah and elsewhere. I was his first patron. Long afterwards he died in East Africa while in the joint employment of Lord Rothschild and myself.

In 1891 I accepted the Chancellorship of the Western University of Pennsylvania (now the University of Pittsburgh). While there I taught anatomy and lectured upon zoology. Teaching was a 'relief' from my former duties. The following year, fortified with letters from the U. S. Commissioner of Education, I went to England, France and Germany to study their technical schools. I took with me at the time several thousand lepidoptera from Africa and spent about a month identifying these at the British Museum and at the museums in Paris and Berlin. The result of this trip was very gratifying as I made many good friends among the scientific men of those countries.

During all these years there had been a close friendship between Mr. Andrew Carnegie and myself and he often honored me by confidentially discussing with me his plans for the development of the cultural institutions which he wished to establish in Pittsburgh and elsewhere. Thus in 1898, though still the Chancellor of the University, I was elected Director of the new Carnegie Museum, the formulation of the plans for that institution having already for some years been largely entrusted to my care by my associates on the Board of Trustees because of my knowledge of such institutions in Europe and in America.

While carrying on paleontological investigations in the Rocky Mountains of Wyoming in 1899, I suffered an attack of appendicitis which nearly proved fatal. While slowly recovering, Mr. Carnegie persuaded me to give up the Chancellorship and devote my entire time to the Museum and to scientific research. This I did, but continued as a member of the Board of Trustees of the University, a position I still hold, being at the present writing, the senior member of that body. I should not forget to mention that about this time I devoted much study to a system of water purification for the City of Pittsburgh, making a couple of European trips to find out what they were doing over there. As a member of the Filtration Commission, plans were prepared and as a result the city is today practically free from the typhoid scourge. If I had done nothing else for Pittsburgh than this, I should be happy.

The *Butterfly Book* was published by me in 1898. I recognized the fact that there was no compendium of information about the general diurnal lepidoptera of North America in existence. I knew that the youth, as well as the scientific workers, would welcome such a volume. The plates were carefully made in Chicago and I dictated the text at odd moments. It was rapidly prepared. Nearly sixty thousand copies have been sold and I followed it with the *Moth Book* which I feel was equally well received. I have tried to popularize the study of lepidoptera in America and by editing a reasonably priced book, I believe I have helped along the cause. The *Butterfly*

Guide, a small condensed volume, has also caught the fancy of many budding amateurs.

Among the many entomological papers published in the past, the following may be worthy of note:

'The Diurnal Lepidoptera of Celebes', (Proc. Boston Soc. Nat. Hist., Vol XXV, 1900).

'The Lepidoptera of Buru', (Novitates Zoologicae, Vol. VII, 1900).

'New Genera and Species of African Lepidoptera', (articles in Psyche, 1893-94).

'A Preliminary Revision and Synonymic Catalog of Hesperiidae of Africa and Adjacent Islands, etc.', (Proc. of Zoological Soc., London, 1896).

'The Lepidoptera of the Congo', (Bull. Am. Mus. Nat. Hist., XLIII, 1920).

'Epipaschiinae of the Western Hemisphere', (Ann. Carn. Mus., XVI, 1925).

I have had the pleasure of writing numerous papers upon paleontology and have always taken a special interest in dinosaurs. Under my direction the Carnegie Museum has acquired one of the largest collections of these curious reptiles in existence.

Speaking of Museums again, I undertook in 1906 the task of organizing the American Association of Museums and succeeded. That body, which has continued a useful existence since its origin, will soon celebrate its twenty-fifth Anniversary.

During my long life, I have known personally every President of the United States since Grant (excepting Hoover) and most of the Presidents of the Republic of France. During the World War I served as Belgian Consul in Western Pennsylvania and had the pleasure of helping to entertain King Albert and his Queen on the occasion of their visit to Pittsburgh. Various degrees and honors have come to me in the past and I hope I am worthy of their bestowal. Several foreign governments have seen fit to present Orders for the work in paleontology and as an educator. I am particularly proud of the degree of D.D. received from my *alma mater*, of the

degree of LL.D. from the St. Andrew University, Scotland, and the degree of L.H.D. bestowed in June, 1928, by the University which I have so long served. Perhaps the greatest honor I ever received was on my eightieth birthday, last year, when the hundreds of delegates to the Fourth International Entomological Congress made me by acclamation an Honorary Life Member of that and following Congresses. I appreciated that real token of esteem and especially as coming from those whom I had known for so long.

Personal hobbies? Well, in my youth I loved all outdoor sports and was a good swimmer. I was fond of horses and rode a great deal. In the last few years I like a good game of golf, but rarely get the chance to swing the clubs! I always enjoy a game of whist, but have grown rusty as a chess-player. Years ago in Japan I achieved quite a reputation over the chess board. They were fine players over there, too.

You ask me about my outstanding mental traits. It seems that nature has always endowed me with a good memory, not quite so good today perhaps as it used to be, but I still retain a reading knowledge of a number of the ancient languages and can remember where many lepidoptera species, for example, were figured and described. I am naturally of an active and industrious turn and the only thing that troubles me is lack of time in which to do the things I would like to do. My favorite motto since childhood has been: 'Get wisdom, get understanding!'; coupled with the other text: 'Whatsoever the hands find to do, do it with might!'."

The accompanying portrait-photo of Dr. Holland was taken March 18, 1929. He is shown sitting at his desk, busy as usual and looking over a sample butterfly proof plate which is one of several going into the new revised edition of *The Butterfly Book* shortly to appear. Who among us but does not envy "that grand old man of the Carnegie" who at 81 is as fit and as active as ever and who is an inspiration to us all? His name will ever live as the one who popularized the study of American lepidoptera.

All hail, dear old Dr. Holland!!

Some New Siphonaptera.

By CARROLL FOX, Surgeon, United States Public Health Service.

Hectopsylla suarezi n. sp.

Near *H. stomis* Jordan 1925. Frons without angle, posterior margin of occiput without lateral lobe, ventral genal lobe and genal process close together, pygidium and anal tergite short.

We have a series of these fleas all ♀ ♀ collected by Dr. V. A. Suarez, Director General of Public Health, Ecuador.

Host: Guinea pigs (Cobaya), also taken from *Rattus norvegicus* and *Rattus rattus*, Quito, ECUADOR.

Type: ♀, U. S. National Museum Collection. Cat. No. 41819.

Anomiopsyllus falsicalifornicus n. sp.

In April 1926, the writer described a flea in the Pan Pacific Entomologist Vol. 11, No. 4 as the male of *Anomiopsyllus californicus*. Recently Dr. Karl Jordan has had an opportunity to study these specimens and to compare them with the material in the Tring Museum.

He states as follows: "Among the specimens of *A. californicus*, from CALIFORNIA, which you kindly gave me, there are two species: one agreeing with *nudatus* and being true *californicus*, and the other being the species you figured as *californicus*. This second species requires a name: * * * The female of this new species is different from our Californian female, which agrees with *nudatus*, as does the before-mentioned male from California."

Types ♂ U. S. National Museum Collection. Cat. No. 28921.

CERATOPHYLLUS NEPOS **dieteri,** n. subsp.

♂ Immovable process of claspers narrow. ♀ Similar to *C. latens* Jordan 1925, sinus of VII sternite very narrow, head of spermatheca longer.

Host: *Lynx ruffus*. Los Angeles County, CALIFORNIA.

Type: ♂, U. S. National Museum Collection. Cat. No. 41820.

Studies in Oxybeline Wasps (Sphecidae, Hymen.).

I. Enchemicrum, an Annectant between Belomicrus and Oxybelus.

By V. S. L. Pate, Cornell University.

ENCHEMICRUM gen. nov.

(ἔγχος, τὸ, spear + μικρός, small)

Head as wide as, or wider than, the thorax. Face moderately wide. Eyes reaching the bases of the mandibles, moderately divergent above and below, with dorsal and posterior facets smaller than anterior ventral ones. Ocelli arranged in a low isosceles triangle; posterior pair nearer the compound eyes than each other; an oblique impression between the lateral ocelli and the compound eyes. Mandibles acute at apex, with a blunt tooth at about the middle of the inner margin and, in the male, excised at the middle of the outer margin. Median area of clypeus more or less produced in the male. Antennae 13-jointed in the male, 12-jointed in the female, inserted just above the posterior margin of the clypeus and about as far from each other as they are from the eyes; flagellum short, joints, except the last, about as wide as long. Face more or less flat, with two smooth impressions on the lower half to accommodate the scapes when laid back. Temples wide above, rapidly narrowing below. Occipital carina wanting.

Thorax moderately stout. Pronotum short, linear, nearly level with the mesonotum, its anterior face vertical. Mesopleurum with a well defined epicnemium (prepectus) and without a distinct crest or ridge before the middle coxae. Scutellum and postscutellum without a median longitudinal carina. Postscutellum produced on the hind margin into membranous lamellae. Dorsum of propodeum with a small straight mucro or median process below which is a well defined enclosed median area.

Abdomen ovate, widest at second segment. First and second tergites subcarinate along the edge of the dorso-ventral fold, but not sharply flexed as in *Belomicrus;* sternites not flat. Tergites without lateral teeth in the ♂. Pygidial area defined in both sexes, triangular in the ♀, more or less trapezoidal in the ♂.

Wings: Stigma distinct. Forewing with radial cell broadly truncate at apex, and with distinct appendiculate cell; first cubital and first discoidal cells confluent, separated at most by a *vena spuria.*

Legs moderately spinose. Middle and hind tibiae with three

rows of spines; middle tibiae with one spur apically. Middle coxae far apart and sunk into the sternum. Tarsal comb weakly developed in the ♀, quite rudimentary in the ♂. Last joint of tarsi moderately swollen; pulvillus large; claws unarmed.

Puncturation of body similar to *Belomicrus,* much finer than *Oxybelus.*

Genotype: Enchemicrum australe sp. nov.

Enchemicrum australe sp. nov.

♂. 4.5 mm. long. Black. Mandibles lemon yellow, apex red. Scapes yellow with a black line internally; flagellum black becoming rufous apically. Tarsi, anterior and middle tibiae, posterior tibiae externally, anterior and middle femora beneath, posterior femora at apex, pronotum with tubercles, and postscutellum stramineous. First and second abdominal tergites with broad yellow bands laterally, those of the first segment twice the size of the second; last two segments rufous. Tegulae, squamae, tip of mucro, and posterior margins of abdominal tergites and sternites subhyaline.

Front and clypeus clothed with short appressed silvery pubescence; thorax, abdomen and legs sparsely clothed with quite short silver hairs.

Head finely but distinctly punctured; occiput striato-punctate. Medially produced portion of clypeus tridentate; front slightly crested medially and with a shallow sulcus on each side parallel to the inner orbits of the compound eyes; anterior ocellus situated in a shallow fossa.

Thorax with puncturation similar to that of head. Pronotum transversely carinate anteriorly and with a median longitudinal sulcus. Mesonotum with a very fine double stria on the anterior two-fifths. Squamae linear, without lateral or terminal points. Epicnemium and mesepisterna carinate anteriorly; metapleura with oblique rugae. Mucro short, straight, scarcely exceeding the level of the squamae, canaliculate anteriorly and dorsally, apex acute. Propodeum with oblique rugae and reticulations above; median area wedge-shaped, shining within; lateral areas finely punctured and with a few transverse rugae; lateral faces shining, finely punctured and with very fine oblique striae.

Abdomen shining, with fine well separated punctures; without any indication of lateral spines; last tergite (pygidium) emarginate apically; sternites each with a low, rounded, polished ridge preapically.

Wings hyaline, nervures testaceous.

Legs with calcaria of hind tibiae at least three-fourths the length of the hind metatarsi.

♀. 5.4 mm. long. Differs from ♂ as follows: Scape of antennae yellow apically only; maculations of abdomen smaller; only last segment of abdomen rufous. Clypeus with a polished, impunctate bevel; truncate apically, lateral angles prominent, median area gently curved, anteriorly with a rounded protuberance. Mandibles not excised externally, at most shallowly sinuate.

Holotype.—♂, Tulsa, OKLAHOMA. July 18 (J. C. Bradley) [Cornell University, Type no. 944.1]. *Allotype.*—♀, Tulsa, OKLAHOMA. July 18 (J. C. Bradley) [Cornell University, Type no. 944.2]. *Paratypes:* OKLAHOMA—2 ♂ ♂, Tulsa, July 18 (J. C. B.) [C. U., no. 944.3-944.4]. LOUISIANA—1 ♀, Darrow, June 19 (Jos. Bequaert) [C. U., no. 944.6]; 2 ♂ ♂, Logansport, June 1 (J. C. B.) [C. U., no. 944.7-944.8]. TEXAS —1 ♀, Feodor, July 6 (Birkmann) [Academy of Natural Sciences of Philadelphia]; 1 ♂, Galveston, May 30 (J. C. B.) [C. U., no. 944.5]; 2 ♂ ♂, Richmond, Brazos River, June 22 (J. C. B.) [C. U., no. 944.9-944.10]. ARIZONA—1 ♂, San Suor (sic!), July 14 (J. C. B.) [C. U., no. 944.11]. ALABAMA—6 ♂ ♂, Burkville, June 10 (J. C. B.) [C. U., no. 944.12-944.17].

All specimens were apparently caught on low ground in the near vicinity of streams. The specimens from Burkville, Ala., and Richmond, Tex., have the maculations cyanided.

Enchemicrum is an annectant between *Belomicrus* Costa and *Oxybelus* Latr. Its affinities with Belomicrus are evidenced by the fine puncturation of the body, the armature of the postscutellum and propodeum, the impressed ocular-ocellar groove and the absence of a distinct crest or ridge on the mesepisterna before the middle coxae. Were it not for the well developed squamae and mucro, the presence of a well defined, enclosed median area on the propodeum and the tarsal comb, *australe* might be considered a New World representative of that interesting Æthiopian subgenus, *Brimoccelus* Arnold.

Until further material is forthcoming, the following key will serve to separate the Nearctic genera of Oxybeline wasps:

1. Tergites 1-5 (and 6 in the ♂) abruptly flexed under at the sides, so that the ventral and dorsal portions of the

tergites form a sharp edge at their junction; the sternites are flat. Last tarsal joint not swollen. Appendiculate cell of the forewing, if present, very small, so that the radial cell appears lanceolate or acute at apex ..... *Belomicrus* Costa.

Tergites not sharply flexed under at the sides; the sternites are convex. Last tarsal joint swollen. Appendiculate cell of the forewing wide so that the radial cell is truncate at apex ..... (2)

2. Mesepisternum with a precoxal carina; scutellum and postscutellum longitudinally carinate in the middle; puncturation of body coarse ..... *Oxybelus* Latreille.

Mesepisternum without a precoxal carina; scutellum and postscutellum not carinate; puncturation of body fine *Enchemicrum* Pate.

A Method for Rearing Mushroom Insects and Mites.*

By C. A. THOMAS, Pennsylvania State College.

While conducting studies on the biology and control of insects and mites affecting cultivated mushrooms, it was necessary to rear large numbers of these pests. Various rearing methods were tried, including the use of soil in salve boxes, manure in vials, etc., but none was found more satisfactory than the following.

The insects and mites were obtained in as pure a culture as possible. They were then introduced in small numbers into fresh one-quart bottles of commercial mushroom spawn, and allowed to breed and develop. This spawn is made of chopped straw and manure thoroughly mixed, sterilized in an autoclave, and later inoculated with mushroom mycelium, grown from spores. With incubation at room temperature, the mycelium penetrates to the bottom of the bottles and completely fills the interstices of the medium. This spawn is thus pure-culture and is uncontaminated with molds.

It is very important that the flies and springtails to be reared should be free from mites, the hypopi of which are often carried on their bodies. Otherwise the mites may breed so rapidly as to destroy the mycelium and perhaps starve the insects.

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Contamination with molds should also be prevented as much as possible.

These bottles of insect colonies should be kept in a somewhat humid atmosphere, as many species of Springtails cannot withstand drying of the cultures. After the cultures have been developing for awhile the insect excreta, as well as bacteria entering with the insects, will usually make the medium moist enough so that further additions of moisture are unnecessary. Tight cotton plugs are used in the bottle mouths.

Most of the rearing experiments were carried on at temperatures between 50 and 65 degrees Fahr., as these represent the usual temperature limits of the bearing mushroom houses.

The mushroom mycelium furnishes an excellent food for these mushroom pests, and they gradually eat it out, leaving the original straw-manure medium. Feeding begins at the top of the spawn, and as it progresses, the portion destroyed is sharply differentiated from the uneaten part. Eggs are laid and the stages develop right next to the glass, where they are easily observed with a binocular microscope. In studying the development of any particular eggs or groups of other stages, a circle is drawn around them on the glass with a wax pencil. They are thus readily referred to.

The following insects have been successfully reared in spawn bottles of this type:

DIPTERA: Sciaridae, Mycetophilidae.

Sciara coprophila Lintner.—det. by O. A. Johannsen.

Neosciara pauciseta Felt.—det. by Johannsen.

Many generations of these flies have been reared in these spawn bottles, one series for over one and one-half years in the same bottles. Three generations of a parasite of these flies were also reared. This parasite is a species of the Hymenopteron *Calliceras* (*Ceraphron*), near *ampla* Ashmead, as determined by Gahan, who says it is probably a new species.

DIPTERA: Cecidomyiidae. Small orange-colored flies of this family, the larvae of which were collected in mushroom caps and mushroom beds, have been reared successfully. These flies have not yet been identified.

COLLEMBOLA (Springtails)—These tiny insects are sometimes rather difficult to rear under experimental conditions, due to their susceptibility to dessication, but in these spawn bottles they thrive remarkably well, and large numbers of the following species have been reared.

Achorutes armatus Nic. Very large numbers of these tiny gray springtails are commonly found in manure piles and in mushroom houses. In the latter they sometimes do considerable damage by feeding on the mushroom caps and on the mycelium in the beds. They thrive in the spawn bottles but are quite susceptible to drying. Immense numbers of these springtails gather in the aisles of the mushroom houses where they form piles sometimes a foot in diameter and several inches deep, containing probably millions of individuals. It is presumed that these are breeding piles, although pairing has not actually been observed.

Proisotoma (*Isotoma*) *minuta* Tullb. Collected in soil. Usually breeds rapidly in spawn bottles.

Isotoma sp. Probably a new species, according to Dr. J. W. Folsom.

Lepidocyrtus cyaneus Tullb. This species breeds very readily in spawn bottles. It is usually common, sometimes abundant in mushroom houses, where it feeds on the mycelium in the beds. It can withstand somewhat dryer conditions than can some of the other springtails.

L. albus Pck. Breeds readily in spawn bottles. Collected from soil in cultivated field, Bustleton, Pa.

Sminthurus caecus Tullb. Breeds slowly in spawn bottles. This is a very interesting little white species, dotted with red. It was collected at Bustleton, Pa. Are there any other Pennsylvania records for this species?

ACARINA (Mites). There usually is no trouble in rearing Tyroglyphids and numerous other mites in the spawn bottles. In fact it is often difficult to obtain pure cultures of mushroom insects because of infestation by these pests. The chief species feeding on mushrooms and mycelium are Tyroglyphids, chiefly *Tyroglyphus lintneri* Osborn, another *Tyroglyphus*

species and sometimes a species of *Histiostome* which feeds on the decaying tissues of injured or diseased mushrooms.

All of the above mites have been reared through many generations in the spawn bottles, and all stages, including the very interesting hypopi of the Tyroglyphids, have been found in the spawn. Abundance of moisture is no deterrent to the development of these mites as they may often be found partly submerged in the moist surface of the spawn medium.

From the notes given above it is evident that mushroom spawn forms an excellent medium for rearing and observing mushroom insects and mites. It is probable that other fungus insects could be reared in these bottles provided the moisture and other factors were regulated to suit the species. In order to make smaller cultures the spawn may be removed to smaller bottles or vials. However, it is necessary to avoid contamination with molds and with mites during this process.

Arachnara subcarnea Kell. (Lepidop.: Noctuidae) a Host of Masicera senilis Rond. (Dipt.: Tachinidae).

At Monroe, Michigan, during the summer of 1928, the author collected from a stalk of cat-tail (*Typha latifolia*) one specimen of *Arachnara subcarnea* Kell. in the larval stage, from which emerged two specimens of *Masicera senilis* Rond. both of them females. The parasites, feeding internally at time of collection, pupated externally some four days later, and emerged on August 21, having been reared under laboratory conditions (Temperature 80°F; Humidity 74%). The host was determined by the late Dr. H. G. Dyar and the parasite by Dr. J. M. Aldrich, both of the U. S. National Museum at Washington. *Masicera senilis* Rond. is an imported parasite of the European corn borer (*Pyrausta nubilalis* Hubn.) and has only recently been found identical with *Masicera myoidea* Desv., a native of this country.

It might be of interest to know that the base of the *Typha* stalk from which the host larva was dissected was submerged in water at a depth of approximately 18 inches. It was therefore necessary to insure a very moist condition while rearing the parasites.

A. C. Cole, Jr., Ohio State University.

Orphan Nests of Polistes (Hym.: Vespidae).

By PHIL RAU, Kirkwood, Missouri.

The nest known as 108 was an orphan nest of *P. pallipes* taken from Wickes, Mo., June 19, 1920. At that date it comprised eight closed cells. Just one week later I discovered, at 6 a. m., that three adults had emerged and were clinging to the nest. It had been on the table at the time of their emergence, and was now moved to a west window; after a few minutes one and then another flew away, the first taking a flight of orientation. The third one was faithful and remained on the nest.

There has been some doubt as to whether the young adults bite their way out, or whether others on the nest assist them in emerging. In this case, at least the first one must have bitten its own way out unaided.

The next morning, June 27, this one was still acting as queen. One other cell had been opened, but whether an adult had emerged and flown away, or whether the first had turned cannibal, I do not know. It was by this time evident that this one was acting queen; she assumed full charge of the nest, and, when I came too near, flew down promptly with defiant air, and stung me, then flew high into the air and dashed away. She had evidently explored the neighborhood, for she flew directly back after ten minutes. A little later a second one flew in and alighted on the nest, perhaps the one whose open cell had just been discovered. This now made two on the nest; the critical question arose, which was to be queen?

By July 4 there were on the nest three adults, two closed cells, and one full-grown larva about ready to spin its cap. There were also some small cells and thriving young larvae; this condition indicated that the workers had been faithful to duty. For the several days following, these three adults continued to assume the care of the nest. One of them was constantly on duty. One would bring in a ball of pulp, divide it in half and both or all would do the masticating preparatory to applying it to the walls. They gave much attention to strengthening the point of attachment to the wall. This nest was pinned to the

wall; they entirely covered the pin with pulp, even that part above its entrance into the nest where the added material obviously was of no value. Some very effectual braces of paper pulp were built around the base of the pin to the woodwork. Even an additional thin petiole was inserted, connecting the nest with a projecting strip of wood only a quarter-inch away. Their activities in general seemed to be quite the same as though the wasps had emerged in normal homes with parents and sisters.

Besides this work of bracing up the nest, several of the unfinished cells were completed and three new ones added; the colors of the material showed clearly where the additions had been begun. On July 23, ten of these new cells contained eggs.

Polistes pallipes nest. Arrow indicates portion built by orphan workers.

Orphan wasps often add cells to the nest, not in a circle around those already existing, but to one side as seen in figure 1. The fact that they build cells without ever having been shown how to do the work, places this activity in the category of instinct. Yet the fact confronts us that these cells are all built at one side, whereas *pallipes* always places the cells in a circle with the petiole in the center. This digression from the usual form by the orphan workers leads one to suspect that while cell making is instinctive, the placing of the cells in symmetrical position is either learned or acquired by imitation.

The material for nest-building was all brought in from the outside, and not lazily obtained, as might be expected, by tearaway old parts of the nest to build new sections.

During this period, while I could not give them constant attention, I failed at any time to find the nest alone; one guard was always in attendance. A series of markings in paint were placed on these wasps on July 21, in order to determine whether or not it was always the same one, or whether more than one assumed the duties of queen or guard.

I suppose some of the earlier ones got lost; it was really surprising that they could find their way home. All their relatives and immediate ancestors had homes in sheds, less than ten feet above the ground; here these nests were pinned to a window sash on a third-floor window at more than three times their normal height, in a row of city houses which looked enough alike to confuse any person. Then there were three windows in a row, about three feet apart, yet the wasps learned to come not only to the abnormal height, but also to the right house and the right window of the series. At first they would often enter the wrong window, and sometimes even though they flew out again by the right one they would reenter the first wrong one, and so on. Thus at first they displayed great difficulty in locating their nest, but later they became very skillful at it.

Thus as the colony grew, these three orphan adults still had charge of the nest. They were marked, and the details of their conduct were recorded. The nest at this time comprised two sealed cells, six half-grown larvae and ten eggs.

At 9:05 a. m., "blue-dot" was manipulating a ball of food-pulp; at intervals she poked her head into the various cells of the larvae. At 9:22, she distributed the remainder of the ball, but the hungry larvae gulped it down so quickly that I could not see what it was.

At 9:15, "small-dot" flew out; at 9:17, "yellow-wing" flew away. Up to 11 o'clock neither of them had returned, but "blue-dot" never left the nest during that period.

At 11:15, "small-dot" returned, passed a ball of brownish material which proved to be food, to "blue-dot"; two hours she had spent in search of a mouthful. "Blue-dot" chewed and rolled the caterpillar in her jaws for three minutes, and then made the rounds of the cells, poking her head inside and leaving a bit of meat in each, as I could see by creeping up under the nest and peering into the mouths of the larvae. This was devoured with the eager haste that is characteristic of most young creatures. Meanwhile, "small-dot", the one which had brought it in, made her toilet, poked her head inquiringly into two of the cells, and flew away again at 11:22, presumably to fetch the

remainder of her caterpillar. I watched closely for her, thinking that if she had noted the place, she could easily find it without being gone two hours this time. In just three minutes she returned with her load, but did not pass it to "blue-dot", whom I had begun to regard as provisional queen, but instead she walked nervously over the nest. By this time I had discovered that the material was after all not food but paper pulp; soon she found the unfinished cell and worked it in. A few seconds after "small-dot's" arrival with the load, "blue-dot" flew away, but when she returned empty-handed in five minutes, I realized that this was only a queenly flight for exercise and not for work. She returned before "small-dot" left, however, so as to be on guard.

Twelve-thirty arrived, and in all that time "yellow-wing" had not returned, excepting that once at about 10 o'clock she flew in at the window and right out again, without even stopping on the nest. She was then empty-handed.

At 12:35, "small-dot" returned with a large mass of green caterpillar-meat. This was chewed or malaxated in partnership for some time and then divided. "Small-dot" broke off about one-fourth of the piece, manipulated it and then fed it to the larvae, while queen "blue-dot" took the larger portion, worked it a longer time and disposed of it likewise. There were several larvae to be fed, and each received a small portion which it rapidly consumed. One that I watched closely actually disposed of its portion in three gulps. I think that during this kneading process, some of the food is swallowed by the workers, either accidentally or intentionally. I watched "small-dot" working up her small portion, which fed three larvae. She would manipulate it each time more before feeding it and during the process the mass grew smaller, so I suspected that she was swallowing some of it. The food may merely have been rendered more compact, but at least I am sure that in mere bulk the larvae would have gotten three times as much if she had not worked it thus so long in her jaws. The fore-feet hold the mass while the jaws work it, and after it is distributed, the process of cleaning the legs gives the worker some of the fragments which cling to the feet.

The toilet process is very complete; the hind legs clean the abdomen, and the two pairs of front legs and the pair of hind legs clean each other by rubbing and scraping one leg against another. The front legs also clean the head, eyes and face, while the mouth-parts clean the front legs also. If anyone wonders about the utility of the spines on the legs of Polistes, let him see this cleaning process, where one leg is passed under the spine of another in the cleaning, and their use is apparent.

Immediately after this "small-dot" left again and returned at 12:52 with another large piece of caterpillar. The process of malaxating and feeding was repeated, but this time it took only two minutes. Again she left. Only once did queen "blue-dot" leave the nest when the worker was absent, and then she was gone for only three minutes.

I was obliged to be absent until 6 p. m.; at that time I found "blue-dot" on the nest, as usual. At that time of day the nest, on the outside of the west window, was in the full glare of the sun. This wasp was ventilating the nest by standing on it with the body motionless and rapidly vibrating the wings, for many minutes at a time. At 6:58, "small-dot" returned with a large ball of green caterpillar, and the process of working and dividing it and feeding the young was repeated, and in addition the drinking of saliva, described elsewhere*. A drop of molasses placed on the nest was promptly cleaned up by "small-dot".

It seemed at that time that "yellow-wing" must have met with tragedy, for she did not return all day or at night. "Small-dot" also remained out all night July 25-26, and had not yet come back at 9 a. m., but at 11 p. m., when I returned, she was back on the nest.

On August 3 there were two new adults on the nest; queen "blue-dot" was still faithful. This nest was now established and in good working order, so I pinned nest 255 a few inches above it on August 6. On August 10, at midnight, an examination revealed that "blue-dot" had gone to this nest, and was holding and chewing in the darkness an immense ball of larva meat, which had evidently been taken from one of the cells. Two hours before she had not been on the nest. Further survey

*Psyche **35**: 153-156, 1928.

discovered "small-dot", also from the nest below (No. 108) on nest 260, which was pinned to the opposite window. Such marauding was really becoming alarming! Were these the acts of individuals under abnormal conditions, or were they instances of a common depredation which, under cover of darkness, had not been discovered? On August 12, 8 a. m., "blue-dot" was still on the nest, and at that time I also found two other marked adults from nest 108 there devouring the larvae, while the five others, one to two days old, on this nest did not show these cannibalistic tendencies. These five young showed a lively war spirit when I came close; they did not launch a direct attack, but stood erect, vibrated the wings and made much threatening commotion. The old queen took my visits coldly; I could almost poke my nose into one of the cells without agitating her. All of the workers had at this time deserted nest 108. Their action could not have been because they had naught to live for inasmuch as the cells still contained eight eggs, seven larvae and two pupae. During the next day, August 13, "blue-dot" was coming and going and apparently doing as she pleased on nest 255, while her old nest (108) was completely deserted.

Let us for the time shift our attention to a *P. variatus* nest, which now entered into the complications. In the story just finished I record the disappearance of "yellow-wing" from her nest, her last appearance there being the time when she casually passed by on the wing without stopping. A little later I discovered a *P. pallipes* female with the unmistakable yellow paint on her right wing, on this orphan nest of *P. variatus!* She stood on the nest, poked her head into the cells, and gave every indication of being mistress. From her mark and also from her species it was evident that she belonged elsewhere. I gave her half a *P. pallipes* larva; she took it and walked with it to the roof of the nest where she went through the usual work of squeezing out the inside portion. Three of the cells of this *P. variatus* nest contained one-fourth grown larvae, with no one to feed them, and I thought that her conduct indicated that she intended to nourish them. She carefully worked the meat for fifteen minutes, gathering the muscle tissue into a large neat ball and discarded the entrails, then she astonished me by taking up her burden and flying out of the north window, returned at the south window and began a diligent search—she

was searching for her old nest! Once more she flew out of the window and came back, this time to the middle window, where she found her old nest 108 and handed over her load of provisions to one of the workers then present! She did not return again to the *P. variatus* nest, either to get the rest of her provender, or to enjoy the privilege of playing queen.

Such conduct is difficult to interpret. Some people would probably say that she merely got lost and thought this was her own nest. That seems unlikely in view of the fact that when she had a food ball to dispose of, she soon found her own. It is hard to say why she remained on this nest, apparently quite content, for several hours. One might say that she came to rob it of its larvae, but if that were true she had ample opportunity to do so, she was there alone and undisturbed for a sufficient length of time to act. I wonder if she could have been swayed by an impulse to want to start things anew, but like many of us she lacked the strength of purpose to carry it through.

Another nest of *P. variatus* was brought in from Wesco, Mo., on August 3, 1920. The nest comprised 44 sealed cells, 16 with larvae and 35 containing eggs, about a dozen adults had been routed and left behind. Two days later, August 5, three orphan adults emerged; one was a male! These wasps emerged while the nest was lying inverted on the table; it was then pinned to the inside of a wooden box, to afford it some protection from the intense sunshine. The wasps were then picked up with forceps and placed upon it, but the two workers walked away indifferently and escaped. The male lingered, but showed no purposeful interest in anything; rather, he appeared too stupid to do anything else.

(To be continued.)

Benacus griseus at Electric Light (Heterop.: Belostomatidae).

On Sunday, April 7, 1929, at 10.15 P.M., the giant water bug *Benacus griseus* (Say) was very abundant, flying about a very powerful electric light, some twenty feet high, at the corner of North Broadway and Gay Street, Baltimore, Maryland.—Robert M. Stabler, Zoological Laby., University of Penna., Philadelphia, Penna.

Notice to Contributors to the News.

As the Editor of the NEWS expects to be absent on a visit to Europe from July 10 to September 30, it is requested that all manuscripts, advertisements and other material for insertion in the NEWS be expressly addressed to ENTOMOLOGICAL NEWS, Zoological Laboratory, University of Pennsylvania, Philadelphia, Penna., and, as far as possible, sent well in advance of the earlier date named.

Corythucha decens Stal. in Pennsylvania (Heteropt.: Tingididae).

While collecting on the County line separating Philadelphia and Montgomery counties, I took a single specimen of *Corythucha decens* Stål. with my sweep-net on June 26th, 1927. *C. marmorata* Uhl. was very abundant and I did not notice the specimen of *decens* until I was mounting it. After making several more visits to the same locality I was unsuccessful in securing any more specimens. Due to the fact that there had been some confusion as to the occurrence of *C. decens* in the United States due to wrong determinations and also that it was confused with *C. marmorata* before, I sent the specimen to Dr. Carl J. Drake, of the Iowa State College, and after he had carefully examined it and compared it with the Central American specimens of *C. decens* he had in his collections, he wrote in part as follows:—

"I believe that it would be best to call this species *Corythucha decens* Stål as you have done. The triangular process of the pronotum seems to be slightly long and the hood not quite so strongly inflated as in the Central American species of *C. decens* before me. However, I believe that these differences are only slight variations."

In view of the above, *C. decens* Stål can now be definitely recorded from the United States.—JOHN C. LUTZ, Philadelphia, Pennsylvania.

Notes on Hesperiid Nomenclature (Lepid.).

Lindsey (Ent. News 39:239, 1928) states that "since Hübner's Tentamen has been officially discarded *Urbanus* cannot be used in place of *Hesperia* Auct. *Pyrgus* is the next available name." As previously shown by Lindsey (Ann. Ent. Soc. Am. 18:75, 1925), the generic name *Hesperia* has been wrongly applied since 1872 when both Crotch and Scudder cited *malvae* Linn. as genotype instead of *comma* Linn., thrice cited as genotype before that date. *Hesperia* reverts to the subfamily containing *comma* Linn.; this division of the family taking the name *Hesperiinae* (nec *Pamphilinae*). Barnes and

Lindsey (Ann. Ent. Soc. Am. 15:89, 1922) used the Tentamen name *Urbanus* for Scudder's *Hesperia* (type *malvae* Linn.), and chose the subfamily name *Urbaninae*. As a result of the dropping of *Urbanus* in favor of the next available name, *Pyrgus*, this subfamily should be termed the *Pyrginae* (nec *Hesperiinae* Auct.) (See Article 5 of the International Rules of Zoological Nomenclature.)

Considerable confusion has existed in the use of the generic names, *Goniurus* Hübner (1820) and *Eudamus* Swainson (1831-32). Skinner and Williams (Trans. Am. Ent. Soc. 48:114, 1922) summarize the usage of these names since Watson's citation of *coelus* Cram. as type of *Goniurus* in 1893. They however wrongly assume that Lindsey's usage of *simplicius* Stoll as type of *Goniurus* is based on the first mentioned species; this species was designated as type by Butler in 1870. It appears to the writer however that even Butler's citation was unnecessary. Westwood, in 1852 (Gen. Diurn. Lep., p. 510), in speaking of the species included in *Goniurus* (misspelled "*Goniuris*"), refers to "these species (of which Papilio Proteus may be considered as the type) . . ." In 1875 Scudder (Hist. Sketch Gen. Names) does not mention Westwood's citation but makes the remark under *Goniurus* that "neither Proteus nor Simplicius can be taken as the type, since they are congeneric, and Proteus has been taken as the type of Eudamus." Since *proteus* not only *could* be but *was* taken as type of *Goniurus* by Westwood in 1852, *Eudamus* and *Goniurus* have had the same type from that time. Hence *Eudamus* Swains. (1831-32) falls as synonymous to *Goniurus* Hübn. (1820).—HAROLD H. SHEPARD, Bur. of Ent., Washington, D. C.

Rocky Mountain Conference of Entomologists.

The sixth annual meeting of the Rocky Mountain Conference of Entomologists is to be held in Pingree Park, Colorado, August 19 to 24, 1929. Notices to this effect have been sent to a number of entomologists, but it is impossible to reach all, so readers of ENTOMOLOGICAL NEWS are cordially invited.

Arrangements are such that other members of the family can be accommodated. The meetings are usually quite informal with time permitted for recreation and collecting. The collecting in the mountain area is usually at its best at this season of the year. As arrangements must be made in advance for the taking care of a crowd more than 50 miles from supplies, it is important that the secretary be notified in advance by all who expect to attend. We would also appreciate having subjects for papers or discussions sent at an early date.—GEORGE M. LIST, *Secretary*, Fort Collins, Colorado.

Entomological Literature

COMPILED, WITH THE ASSISTANCE OF "BIOLOGICAL ABSTRACTS," UNDER THE SUPERVISION OF E. T. CRESSON, JR.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

The numbers **within brackets** [ ] refer to the journals, as numbered in the list of Periodicals and Serials published in the January and June numbers (or which may be secured from the publisher of Entomological News for 10c), in which the paper appeared. The number of, or annual **volume**, and in some cases the part, heft, &c. the latter **within** ( ) follows; then the pagination follows the **colon** :

All continued papers, with few exceptions, are recorded only at their first installments.

*Papers containing new forms or names have an * preceding the author's name.

(S) Papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

☞ *Note the change in the method of citing the bibliographical references, as explained above.*

Papers published in the Entomological News are not listed.

GENERAL.—Bequaert, J.—Present trends in systematic entomology; Descriptions. [19] 24: 98-102. **Brues, C. T.**—Present trends in systematic entomology. General discussion. [5] 36: 13-27. **Calder, E. E.**—Obituary. [19] 24: 115. **Doll, J.**—Obituary. [19] 24: 104-109, ill. **Essig, E. O.**—Man's influence on insects. [76] 1929: 499-506, ill. **Friederichs, K.**—A collecting vial. [12] 22: 420. **Frost, C. A.**—The unexpected acid test. [Acid ejected by Carabus vinctus]. [5] 36: 59. **Gunder, J. D.**—Mounted genitalia attached to specimens. [4] 61: 97-98, ill. **Haase, J.**—Die lichtfalle, ein hilfsmittel zur erforschung der lokalfauna. [18] 23: 89-107, ill. **Headlee & Burdette.**—Some facts relative to the effect of high frequency radio waves on insect activity. [6] 37: 59-64. **Heikertinger, F.**—Was ist zu tun in der entomologie? [79] 14: 208-227. **Locke, D.**—The tragic account of the fall of a thriving community of Bolivian umbrella ants. How the supplies they garnered caused their dramatic end. [15] 1929: 296-306, ill. **Neave, F.**—Reports of the Jasper Park Lakes Investigations 1925-1926. Plecoptera. 159-173. Aquatic Insects. 185-195. The Beetles by J. B. Wallis. 221-225. [Contr. Canad. Biol. & Fish.] Vol. 4. **Stiles, C. W.**—Amendments to the international rules of zoological nomenclature. [Norsk Ent. Tidsskrift] 2: 259-261. **v. Tunkl, F. F.**—Kulturgeschichtliche notizen zur heuschreckenplage. [26] 9: 173-176. **Weiss, H. B.**—The entomology of Martin Lister, physician, naturalist and antiquarian. [6] 37: 43-48.

ANATOMY, PHYSIOLOGY, ETC.—Barnes, H. F.—Some remarks on Paedogenesis in gallmidges (Cecidomyidae). [8] 65: 138-139. **Bidder, G. P.**—Geotropism and antennae. [31] 123: 799. **Brohmer, P.**—Schülerübungen über die mundwerkzeuge der insekten als mittel phylogenetischer erkenntnisbildung. [Mikrokosmos] 22: 130-133, ill. **Bugnion, E.**—Les organes bucco-pharyngés de la fourmi coupe-feuilles du Brésil Atta sexdens. [34] 82: 55-78, ill. **Dolley & Wierda.**—Relative sensitivity to light of different parts of the compound eye in Eristalis tenax. [42] 53: 129-139, ill. **Donisthorpe, H.**—Gynandromorphism in ants. [34] 82: 92-96. **Eidmann, H.**—Die koloniegründung von Formica fusca nebst untersuchungen über den brutpflegeinstinkt von Formica rufa. [34] 82: 99-114, ill. **Gerould, J. H.**—History of the discovery of periodic reversal of heart-beats in insects. [92] 56: 215-225. **Headlee, T. J.**—An apparatus for the study of comparative effects of constant versus variable temperatures on the speed of insect metabolism. [6] 37: 25-27. **Hirschler, J.**—Sur la relation entre le noyau et les composants plasmatiques (appareil de Golgi, vacuome) dans les spermatocytes des Lépidoptères. [69] 101: 82-85, ill. **Hosselet, C.**—Les éléments du chondriome dans les espaces nerveux intercellulaires et dans le nerf, chez les insectes. [69] 101: 85-87, ill. **James, H. C.**—On the post-embryonic development of the female genitalia and of other structures in the chalcidoid insect Harmolita graminicola. [93] 1928: 661-695, ill. **Lopez, A. W.**—Morphological studies of the head and mouthparts of the mature codling-moth larva Carpocapsa pomonella. [67] 5: 19-36, ill. **Merker, E.**—Die pigmentverschiebungen im netzauge der insekten unter dem einfluss von ultraviolettem. [89] 46: 297-372, ill. **Nabours & Foster.**—Parthenogenesis and the inheritance of color patterns in the grouse locust Paratettix texanus. [92] 56: 129-155, ill. **Panu & Verrier.**—Contribution a l'etude du pigment et des variations chromatiques de Phyllium siccifolium (Orthoptère phasmide) [77] 100: 1118-1120. **Phillips, E. F.**—Variation and correlation in the appendages of the honeybee. [Cornell Univ. Agric. Exp. Sta.] Mem. 121: 52 pp., ill. **Pierantoni, U.**—L'organo simbiotico di Silvanus surinamensis. [Atti Reale Accad. Naz. Lincei, Roma] 9: 451-455, ill. **Prell, H.**—Die vereinheitlichung der bezeichnungsweise für die verschiedenen generationsfolgen von insekten mit mehrjähriger generation. [34] 8: 203-219. **Rudolfs, W.**—Studies on chemical changes during the life cycle of the tent caterpillar (Malacosoma americana) IV. Glycogen. [6] 37: 17-23, ill. **Salman, K. A.**—The external morphology of Pepsis elegans (Psammocharidae). [1] 55: 119-153, ill.

Timon-David, J.—Action du brome sur les huiles d'insectes. [69] 188: 1122-1124. **Verlaine, L.**—L'instinct et l'intelligence chez les Hyménoptères. IX.—La notion du temps. [33] 69: 115-125. **Whedon, A. D.**—Muscular reorganization in the Odonata during metamorphosis. [92] 56: 177-192, ill. **Woods, W. C.**—The integument of the larva of the alder flea beetle. [19] 24: 116-123, ill. **Zernoff, M. V.**—Essai de sérothérapie chez Galleria melonella. [69] 188: 1321-1323.

ARACHNIDA AND MYRIOPODA.—*Chamberlin, J. C.—Dinocheirus tenoch, an hitherto undescribed genus and species of false scorpion from Mexico (Chelonethida). [55] 5: 171-173. ***Crosby & Bishop.**—Three new species of spiders (Linyphiidae). [4] 61: 101-105.

THE SMALLER ORDER OF INSECTS.—*Kimmins, D. E.—Coryphaeschna longfieldae sp. n., from Brazil, and its allies. [75] 3: 489-493, ill. **Moll, F.**—Termiten als Schädlinge am Holz und der Schutz gegen sie. [Zeit. Pflanzenkrankheiten und Pflanzenschutz] 39: 177-180, ill. **Neave, F.**—Plecoptera. See under general. **Nevin, F. R.**—Larval development of Sympetrum vicinum (Libellulidae; Sympetrini). [1] 55: 79-102, ill. ***Snyder, T. E.**—New termites from the Antilles and Middle America. [10] 31: 79-87, ill. **Stäger, R.**—Der ameisenlöwe tötet sein opfer durch gift. [Kosmos] 26: 176-178. **Walker, E. M.**—The Odonata (dragonflies) of the Lake Abitibi region. [Univ. Toronto Studies Biol. Ser.] 1928: 37-44.

ORTHOPTERA.—Allard, H. A.—The last meadow katydid; a study of its musical reactions to light and temperature (Tettigoniidae). [1] 55: 155-164. ***Beier, M.**—Weitere neue mantiden aus der sammlung des Naturhistorischen Museums in Wien. (S). [34] 8: 245-254, ill. **Fulton, B. B.**—The camouflage cricket Neduba carinata (Tettigoniidae). [55] 5: 175-180, ill. **Hubbell, T. H.**—The distribution of the beach-grasshoppers Trimerotropis huroniana and Trimerotropis maritima interior in the Great Lakes region (Acrididae). [6] 29: 31-38, ill. **Olsen, O. W.**—Notes on the Tetriginae of Utah. [55] 5: 181-182.

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stylus. [An. Soc. Sci. Bruxelles] 46: 74-87. *Schmitz, H. —Eine neue ecitophile Xanionotum-art aus Brasilien. [34] 82: 228-232, ill.

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HYMENOPTERA. — ***Cockerell & Timberlake.** — Two new bees of the genus Triepeolus. [55] 5: 167-170. **Escherich, K.**—Einige notizen über die lebensweise, wirtschaftliche bedeutung und bekämpfung der blattschneiderameisen (Atta). [34] 82: 185-197, ill. ***Ferrière, C.**—Nouveaux Diapriides du Brésil, hôtes des Eciton. [34] 82: 156-171, ill. ***Frison, T. H.**—Additional descriptions, synonymy and records of North American bumblebees (Bremidae). [1] 55: 103-118. **Haskins, C. P.**—Note on an imitation of the deportation habit in Polyergus lucidus. (S). [6] 37: 65-66. **Hicks, C. H.**—Notes on the habits of Anthidium collectum. [4] 61: 84-86. **Joseph, H. C.**—Le repos nocturne chez quelques Hyménoptères du Chili. [34] 82: 414-421, ill. **Karawajew, W.**—Die spinndrüsen der weberameisen (Formicid.). [34] 82: 247-256, ill. **Pitman, E. M.**—The marriage flight of ants. [30] 9: 30. **Rau, P.**—The habitat and dissemination of four species of Polistes wasps. [84] 10: 191-200, ill. **Reichensperger, A.**—Systematische und ökologische Myrmekophilen-beiträge (Staphyl. Hist.). [34] 82: 257-268, ill. ***Santschi, F.**—Nouvelles fourmis de la République Argentine et du Brésil. [An. Soc. Cien. Argentina] 107: 273-316, ill. **Wheeler & Bequaert.**—Amazonian Myrmecophytes and their ants. [34] 82: 10-39, ill. **Wishart, G.**—Large scale production of the egg parasite Trichogramma minutum. [4] 61: 73-76, ill.

SPECIAL NOTICES.—Opinions 105 to 114 rendered by the International Commission on Zoological Nomenclature. [Smiths. Misc. Coll. Vol. 73. No. 6, 26 pp.]. Containing opinions, on Type of Oestrus; and on Sarcoptes Latr.

A Handbook of the Dragonflies of North America. By James G. Needham and Hortense Butler Heywood. Chas. C. Thomas, Springfield, Ill., and Baltimore, Md. Pp. viii, 378, 149 figs. $7.00 net, by post $7.24.

This work represents the first attempt since the publication in 1861 of Hagen's "Synopsis of the Neuroptera of North America" to cover the entire North American dragonfly fauna in a single descriptive treatise. The need of such work is indicated by the fact that the number of species recorded from North America, north of Mexico, has nearly doubled since Hagen's work appeared. The "Handbook", however, is much more than a mere manual for the identification of species. The introductory part contains an excellent general account of the characteristics and life history of dragonflies, together with special sections on the collecting and rearing of these insects and

on their relations to fish culture; while the special part contains tables for the identification of both larvae and adults, as well as descriptions and ecological notes on all of the species.

Perhaps the best part of the book is the general section (Part 1) in which we recognize the facile style and vivid descriptive powers of the senior author. Following a short historical sketch of American odonatology the life history of a well known species (*Anax junius* Dru.) is described to illustrate that of the order as a whole. Then follow sections of the Adult Dragonfly, the Immature Stages, the Eggs, and the Relation of Dragonflies to Fish Culture. The first two of these sections are each divided into several parts, descriptive of structures, habits and methods of collecting and rearing. These sections are well illustrated by some of Professor C. H. Kennedy's fine drawings and also by some attractive little diagrams showing methods of flight and oviposition.

The general plan of the Handbook is admirable and much of this plan is well carried out. The sections on the Zygopterous genera *Enallagma* and *Ischnura*, by C. F. Byers, are particularly thorough. One of the attractive features, which relieves the descriptive part of the dryness usually associated with systematic treatises, is the introduction of copious notes on the habits and habitat of each species, where the data are available, these notes being largely in the form of quotations from the original records. An attempt is made to introduce common names for a number of the better known species.

One does not look in a work of this sort for new features of taxonomy, but we note in the genus *Gomphus* a few changes in the composition of the subgenera, which we believe express better than in previous groupings the relationships of the species. *G. spicatus, e. g.,* is removed from *Arigomphus* to *Gomphus, G. abbreviatus, brevis,* and related forms, as well as the *fraternus* group, from *Gomphus* to *Gomphurus. G. scudderi* and *amnicola* are also placed in *Gomphurus,* although in the opinion of others, including the reviewer, their relationships are with the *Stylurus* group.

The book is well supplied with keys to all the taxonomic groups both in the larval and adult stages. These keys are necessarily made as concise as possible consistent with the proper fulfilment of their purpose, and on the whole they seem to function excellently. But in the keys to species in certain genera too much has been sacrificed for the sake of brevity and simplicity and characters are sometimes used which are trivial and unreliable or even incorrect. This is notably the case in the treatment of *Aeschna* and *Somatochlora.* For instance, *Aeschna coerulea* and *A. sitchensis* are separated by the length of the

stem of the T-spot, a character based apparently upon a badly copied figure, since it does not exist in reality. The distinctions given between *Somatochlora whitehousei* and *S. septentrionalis* are likewise unsound, a particularly unfortunate case, inasmuch as the figures of these two species have been transposed.

Again, in the key to *Leucorrhinia, L. glacialis* is separated from *frigida* and *proxima* by supposed difference in the colour of the thoracic pleura, a difference which, so far as *glacialis* and *proxima* are concerned, is merely a matter of age.

One more instance of this kind may be given. In the key to the females of *Lestes* the two related species *forcipatus* and *disjunctus* are distinguished by length only. This difference in size is by no means constant, for *L. forcipatus* decreases in size northward, while *L. disjunctus* becomes larger in the northwest. The relative size of the ovipositor affords an easy means of separating these two species.

Another series of errors, mostly of only minor importance, is found in connection with the tables in which certain larval characters are given. Some of these pertain to the characters themselves while others are concerned with the references to descriptions.

As to the first of these we have noted only a few cases. In the genus *Leucorrhinia, e. g.,* three of the six species have well developed dorsal spines, while in the other three they are either wholly lacking (the usual condition) or are vestigial (some individuals of *hudsonica*). In the table they are indicated as being present in all the species, and, in the key to the genera of Libellulinae, *Leucorrhinia* is separated from *Sympetrum* by the possession of "dorsal hooks as long as the segments which bear them", and does not appear elsewhere in the key. The character used to separate *Cordulia* from the Somatochloras without dorsal hooks is also invalid, the teeth of the lateral lobes being about equally developed in these genera.

Concerning the references to descriptions of nymphs the value of citing the first published description is not apparent. What is really wanted is the best available description, as in pioneer descriptions the distinctive characters are ofted omitted.

In these references to the first descriptions of nymphs some curious errors occur. *Aeschna constricta, e. g.,* is credited to Needham, the nearly related *A. umbrosa* to Cabot. Both of the descriptions referred to were published under the name of *constricta* before *umbrosa* had been recognized as a separate species, but both really belong to *umbrosa* and the nymph of *constricta* was first described by the present writer.

In the table to the nymphs of *Somatochlora* Needham is again credited with the description of *S. elongata* as well as *S. linearis,* though the references are to the selfsame description. This description, referred by Needham himself to "*Somatochlora* sp. 2" really belongs to *elongata,* as pointed out by the writer in 1924. Since his description was published, however, Needham found *S. linearis* in transformation at Lake Forest, Illinois, and believing the exuviae to be identical with his "species No. 2" referred the latter to *S. linearis.* He had already described as *S. elongata* the nymph of *S. williamsoni.* So that, on this basis, Needham is given the credit of describing the nymphs of all three species.

The nymph of *Enallagma vesperum,* credited to the present writer, was first correctly described by Garman (1917).[1]

The use of trinomials is avoided and this is probably a wise practice in a book that is not intended primarily for the advanced specialist, but there have been some unfortunate consequences of this omission. In the genus *Sympetrum, e. g., S. assimilatum* appears as a species while *S. decisum* is not mentioned at all. Both names have been commonly quoted as subspecies of *rubicundulum,* but *assimilatum* has long been known as a mere colour phase of the latter species, while *decisum* has constant structural characters and deserves to rank as a distinct species. Another instance is that of *Aeschna interrupta,* a transcontinental species consisting of several well-marked races. In this case only the name *interrupta* is used, but the distribution given is that of the *race interrupta,* not of the species as a whole.

This brings us to the question of distribution and one of the most obvious defects of the book is the manner in which the ranges of the various species are given. A few examples will make this clear. *Hetaerina americana,* which is absent from the northern half of North America, being confined in Canada practically to the extreme southern part of Ontario,[2] is said to inhabit "N. Am. generally". British Columbia is included in the range of *Lestes forcipatus,* a species which in Canada is confined to the eastern provinces, while *L. disjunctus,* the commonest British Columbian species, is not mentioned as occurring west of North Dakota. The only locality given for *Coenagrion interrogatum* is the type locality "Sask.", whereas it has been recorded from Newfoundland to the Rocky Mountains, including most of the provinces. The distribution of *Cordulia shurtleffi* as stated (Alaska, B. C., N. J., Pa. and N. Y.) is also misleading as its main range is from Newfoundland

[1] Bull. Ill. State Lab. Nat. Hist. 12:550.
[2] There is an old record from Montreal, Que.

to Hudson Bay, British Columbia and Alaska, occupying the entire Canadian zone, where it is a dominant species. *Macromia illinoiensis* is recorded only from "N. E., N. Y., Pa., Del., N. C." and yet on the same page is a quotation from Williamson in which this species is mentioned as having been taken in large numbers in Sandusky, Ohio. Similarly *M. magnifica* occurs in "Calif., Ariz." although we read a little further on that Kennedy observed it at Satus Creek in Oregon. Both of these species occur in Canada, but Canadian records in particular have been largely ignored. Lastly we may note the case of *Ladona julia*, whose range is given as "N. Y. to Md." This is very incomplete and misleading as *L. julia* is a transcontinental species and ranges northward to the Hudson Bay watershed.

Besides those already mentioned a number of miscellaneous errors have been noted. These are chiefly misprints and misspelled words but the following are more serious:

P. 116. The figures of *Gomphus furcifer* and *G. villosipes* are transposed.

P. 135. The nymph of *Aeschna sitchensis* is omitted from the list of known nymphs of this genus.

P. 181. The figure of *Tetragoneuria spinosa*, referred to under this heading has been omitted.

P. 198. Under *Dorocordulia* appears the statement "Only the nymph of *D. lepida* has been made known (Ndm. '01, p. 505)". This reference is to *D. libera* not *lepida*.

P. 236. The figures of the vulvar laminae of *Sympetrum rubicundulum* and *S. obtrusum* are transposed.

P. 310. Under *Coenagrion* appears the statement "The nymphs of none of our American species have been as yet made known." The nymph of *C. resolutum* was described by the writer in 1914 and by Kennedy in 1915.

The quality of the illustrations is variable. Those of Part I are excellent, as are also all the venational drawings. The figures of appendages and genitalia, however, are of a lower standard and are frequently crude. In some cases where appendages are very similar it would have been better if more distinctive characters had been figured.

As the "Handbook" will doubtless be more generally used for many years than any other work on North American dragonflies it is unfortunate that it is marred by so many inaccuracies. In spite of these it will serve a very useful purpose not only to teachers and general students but also to advanced specialists and more particularly to those in regions where the local fauna is not yet well known.—E. M. WALKER.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

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